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| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/618,219   | 07/10/2003  | Tien-I Bao           | 252011-1390         | 4415             |
| 47390  | 7590        | 04/05/2005           | EXAMINER            |                  |
| THOMAS, KAYDEN, HOSTEMEYER & RISLEY LLP<br>100 GALLERIA PARKWAY<br>SUITE 1750<br>ATLANTA, GA 30339 |             |                      | GOUDREAU, GEORGE A  |                  |
|  |             |                      | ART UNIT            | PAPER NUMBER     |
|  |             |                      | 1763                |                  |

DATE MAILED: 04/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/618,219

Applicant(s)

BAO ET AL.

Examiner

George A. Goudreau

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 31-43 is/are allowed.
- 6) ☒ Claim(s) 1-23 and 26 is/are rejected.
- 7) ☒ Claim(s) 24,25 and 27-30 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

George A. Goudreau  
GEORGE GOUDREAU  
PRIMARY EXAMINER

4-05

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

Art Unit: 1763

1. This action will not be made final due to the new grounds of rejection.
2. Applicant's arguments with respect to claims of record have been considered but are moot in view of the new ground(s) of rejection.
3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-2, 5-9, 11,14-16, 18-21, 23, and 26 are rejected under 35 U.S.C. 102(e) as being anticipated by Bao et. al. (2004/0087164).

Bao et. al. disclose a process for forming a Cu dual damascene structure in a Low-K IMD layer on the surface of a wafer, which is comprised of the following steps:

- A laminate structure which is comprised of a SiC etch stop layer (101)/ a TEOS layer (102)/a N-containing low-K dielectric layer (103)/ a TEOS layer (104)/ a non-N containing BARC layer (105) are formed onto the surface of a wafer (100). (They further disclose that the BARC layer is selected to prevent the formation of resist scum which would occur when a N containing BARC layer is used underneath a DUV type photo resist layer.);
- A patterned DUV photo resist etch mask is formed onto the surface of the laminate.;

Art Unit: 1763

- The BARC layer (105)/TEOS layer (104)/ low-K dielectric layer (103) are then patterned using the photo resist layer as an etch mask to form a via hole (107).;
- The patterned photo resist etch mask is then stripped from the surface of the wafer.;
- A resin solution or an I-lined photo resist material is then spin coated onto the surface of the wafer such that the via hole is filled with a protective resin layer.;
- The resin is then etched from the surface of the wafer such that only a protective sacrificial resin plug (106) is left inside the via hole.;
- A patterned DUV photo resist etch mask (108) is then formed onto the surface of the laminate.; and
- A trench is then etched into the BARC layer (105)/ TEOS layer (104)/ low-K dielectric layer (103) using the patterned photo resist etch mask.

This is discussed specifically on pages 6-7; and discussed in general on pages 1-8. This is shown in figures 1-5.

It would have been inherent that the SiC etch stop layer, which is used in the process taught above is N rich based upon the teachings of the prior art regarding SiC. Also, it would have been inherent that the TEOS barrier layers which are formed on either side of the low-K dielectric layer in the process taught above are comprised of hydrocarbon-containing silicon rich oxide layers. The examiner cites the case law listed below of interest to the applicant in this regard.

Art Unit: 1763

In re Swinehart (169 U.S.P.Q. 226 (CCPA )) and In re Best (195 U.S.P.Q. 430 (CCPA )) state that when an examiner has reasonable basis for believing that functional characteristics asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be inherent characteristics of the prior art, the examiner possesses the authority to require an applicant to prove that the subject matter shown to be in the prior art does not possess the characteristics relied upon.

Thus, it is incumbent upon the applicant to prove that such is not the case.

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 3-4, 10, 12-13, 17, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over the reference as applied in paragraph 4 above.

The reference as recited in paragraph 4 above fail to disclose the following aspects of applicant's claimed invention:

- the specific formation of the barrier layers (i.e.-the TEOS layers) to the specific thicknesses which are claimed by the applicant; and
- the specific formation of the non-N antireflective layer out of the specific materials, which are claimed by the applicant

It would have been obvious to one skilled in the art to form the non-N antireflective layer in the process taught above out of the specific materials, which are claimed by the applicant based upon the following. It is conventional or at least well known in the semiconductor processing arts to form a non-N antireflective layer out of the specific materials, which are claimed by the applicant. (The examiner takes official notice in this regard.) Further, this simply represents the usage of an alternative, and at least equivalent means for forming the antireflective layer in the process taught above to the specific means, which are taught above.

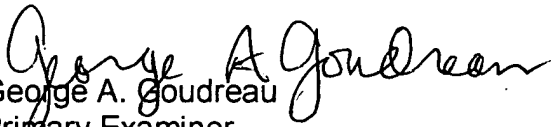
It would have been obvious to one skilled in the art to form the barrier layers in the process taught above to the specific thicknesses, which are claimed by the applicant based upon the following. It would have been desirable to form the barrier layer to sufficient thickness to function as a barrier layer without forming it to an excessive thickness, which would have wasted precious processing time, and processing materials.

8. Claims 24-25, and 27-30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
9. Claims 31-43 are allowed.

Art Unit: 1763

10. Any inquiry concerning this communication should be directed to examiner

George A. Goudreau at telephone number (571)-272-1434.

  
George A. Goudreau  
Primary Examiner  
Art Unit 1763